



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/532,843

12/19/2005

Natarajan Thiagarajan

1-17016

4924

1678 7590 06/10/2009  
MARSHALL & MELHORN, LLC  
FOUR SEAGATE - EIGHTH FLOOR  
TOLEDO, OH 43604

EXAMINER

BULLOCK, IN SUK C

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

06/10/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/532,843	<b>Applicant(s)</b> THIAGARAJAN ET AL.	
	<b>Examiner</b> IN SUK BULLOCK	<b>Art Unit</b> 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 May 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 10-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 December 2005 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/22/2009 has been entered.

### ***Response to Amendment***

In response to the amendment, objection to the drawings is withdrawn.

Addition of new claim 21 is acknowledged. Claims 10-21 currently remain pending in this application.

### ***Interpretation of Invention/Claims***

It is noted by the examiner that the instant specification and the claims recite the term "dehydration". It is understood by one skilled in the art that the term "dehydration" means removal of water. However, the claimed invention is understood to be a dehydrogenation process and not dehydration.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 10-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 96/33150 (hereinafter "WO") in view of U.S. Patent 4,739,124 to Ward (hereinafter "Ward").

The WO reference discloses a process for converting alkane to alkene comprising (a) contacting alkane with a dehydrogenation catalyst under conditions sufficient to produce alkene and hydrogen, wherein the dehydrogenation catalyst comprises at least one metal selected from Cr, Mo, Ga, Zn and a Group VIII metal; (b) contacting the effluent from step (a) with an oxidation catalyst and oxygen under conditions sufficient to selectively convert the hydrogen to water, wherein the oxidation catalyst comprises an oxide of at least one metal selected from Bi, In, Sb, Zn, Tl, Pb and Te; and (c) contacting at least a portion of the effluent of step (b) with a solid material comprising a dehydrogenation catalyst under conditions sufficient to convert unreacted alkane to additional quantities of alkene and hydrogen (page 4, line 18 to page 5, line 2; page 8, lines 5-19; and Figures 1 and 2).

WO fails to disclose adding liquid water to the effluent of step (a).

Ward discloses a dehydrogenation process comprising passing a feed stream admixed with superheated steam into a first dehydrogenation zone to produce an effluent stream; the effluent stream is cooled and admixed with an oxygen-containing gas stream; passing the effluent stream into a separate bed of hydrogen selective oxidation catalyst and producing an oxidation effluent stream; passing the oxidation zone effluent stream through a second bed of dehydrogenation catalyst to produce a second dehydrogenation effluent (col. 2, lines 45-63; col. 7, line 12 thru col. 8, line 39; and col. 9, lines 30-50). The cooling of the dehydrogenation effluent provides for increased in conversion (col. 5, lines 5-48). Ward discloses that the cooling of the dehydrogenation effluent may be performed by indirect, direct, or a combination thereof

in which the effluent is mixed with a low temperature cooling media, i.e., water, which may be a gas or a liquid phase stream (col. 6, lines 1-25).

Thus, it would have been obvious to one skilled in the art to modify the WO reference by cooling the dehydrogenation effluent as disclosed by Ward for an enhanced conversion. It would, also, have been obvious to add water and/or water vapor in the direct cooling step as, also, disclosed by Ward (col. 6, lines 1-25).

With regard to the claimed dehydrogenation catalyst comprising Pt and Sn on an aluminate carrier, WO discloses a dehydrogenation catalyst comprising a supported Group VIII metal, i.e., Pt/Sn/ZSM-5 (page 6, line 35 to page 7, line 18).

### ***Response to Arguments***

Applicants' arguments have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IN SUK BULLOCK whose telephone number is (571)272-5954. The examiner can normally be reached on Monday - Friday 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1797

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/In Suk Bullock/  
Primary Examiner, Art Unit 1797